

NEW GASTROPODS FROM THE ABROLHOS ARCHIPELAGO AND REEF COMPLEX, BRAZIL

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Abstract.—Ten new gastropods, *Acmaea (Collisella) abrolhosensis*, *Cyphoma macumba*, *Dermomurex (Trialatella) oxum*, *Muricopsis oxossi*, *Murexiella iemanja*, *Latirus (Polygonia) ogum*, *Oliva (Plicoliva) zelindae*, *Vexillum (Costellaria) kaicherae*, *Vexillum (Costellaria) lixa*, and *Conus iansa*, are described from the Abrolhos Archipelago and reef complex, Bahia State, Brazil. A new subgenus, *Plicoliva*, of the genus *Oliva*, family Olividae, is also described. The unusual nature of the Abrolhos mollusk fauna and the unique ecological conditions characteristic of the area are outlined.

The Abrolhos Archipelago region (ranging from approximately 17°26'S to 18°11'S and 38°34'W to 39°17'W) off the south coast of Bahia State, Brazil, comprises 5 islands, 2 major coral reef complexes, and innumerable smaller isolated reefs. The archipelago (approx. 17°57'S, 38°42'W) includes the island of Santa Barbara, about 2 km in length, and the smaller islands Siriba, Redonda, Sueste, and Guarita, and represents the southernmost extensive coral reef growth in the western Atlantic (Laborel, 1969: 125, fig. 45).

The Abrolhos area is malacologically poorly known; only small, incomplete collections have been taken since Charles Darwin briefly visited the archipelago in the 1830's. Hartt (1870: 174–214) published an account of the geology and natural history of the Abrolhos reefs and islands but only mentioned a few species of mollusks. In this century, the only major expedition to collect around the islands was that of the CALYPSO in 1961–1962. This involved a few days SCUBA diving on some of the adjacent reef complexes and was by no means comprehensive. During July, 1977, I had the opportunity to visit the archipelago and surrounding reefs. Material was acquired by SCUBA diving, snorkeling, and reef and shore collecting at low tide. Studies of this material showed that several gastropods were new to science; the new taxa are described herein.

Physical Characteristics of the Abrolhos Area

The Abrolhos Archipelago are high islands and have coastlines composed of steep cliffs with low bordering rock platforms. Geologically, they are a mixture of sedimentary and igneous rocks (Hartt, 1870: 174–176) and their history has still not been completely worked out. Between the mainland and

the islands there are extensive coral reef complexes—the largest of these being the rectangular-shaped Parcel das Paredes, a reef of over 30 km length on a side. North and south of the Parcel das Paredes are series of large reefs that are exposed at low tide. Another extensive reef system, the Parcel dos Abrolhos, borders the edge of the continental shelf just east of the archipelago.

Scattered throughout the area are large numbers of small (10–50 m diameter) vase or inverted wide-brimmed hat-shaped reefs called “chapeirões” by the native Bahianos. These reefs, composed primarily of 3 species of *Mussismillia* corals, *Millepora* hydrocorals, and coralline algae, rise abruptly from the flat sea floor of the Abrolhos Platform. These giant “hats” spread horizontally just below the sea surface and eventually fuse with other “chapeirões” to form the larger reef complexes (Laborel, 1969: 136–137, figs. 51–52). The sea floor between the mainland and the “chapeirões,” reef complexes, and high islands is composed primarily of soft calcareous muds and oozes. Mean depth throughout the Platform area is only about 25 m.

Aspects of the Abrolhos Gastropod Fauna

New species described in this paper include:

Family Patellidae

Acmaea (Collisella) abrolhosensis n. sp.

Family Ovulidae

Cyphoma macumba n. sp.

Family Muricidae

Dermomurex (Trialatella) oxum n. sp.

Muricopsis oxossi n. sp.

Murexiella iemanja n. sp.

Family Fasciolariidae

Latirus (Polygona) ogum n. sp.

Family Olividae

Oliva (Plicoliva) zelindae n. subgen. and n. sp.

Family Costellariidae

Vexillum (Costellaria) kaicherae n. sp.

Vexillum (Costellaria) lixa n. sp.

Family Conidae

Conus iansa n. sp.

Besides these new species, several other Abrolhos gastropods are noted in order to emphasize the unusual aspects of the fauna. These are arranged by ecological preferences.

1. *Rocky Shorelines of the Islands*.—In the supratidal zone, only 3 species of *Littorina* were collected. *Littorina ziczac* (Gmelin, 1791) and *L.*

flava King and Broderip, 1832, were rare, with only 2 specimens of each taken on Santa Barbara. On the other hand, *L. angulifera* (Lamarck, 1822) (the mangrove periwinkle) was abundant even though there were no mangroves on the Abrolhos. These were much larger, heavier, and stockier than the typical form. They were also more colorful, often with dark spottings of purple and red.

At the mean low water line, only *Leucozonia brasiliiana* (d'Orbigny, 1841), *Leucozonia lineata* Usticke, 1969, *Acmaea* (*Collisella*) *abrolhosensis* n. sp., and *Siphonaria hispida* E. A. Smith, 1890, were common.

2. *Fringing Reefs and "Chapeirões."*—At depths of 2 m and less on the reef platforms, commonly encountered species included *Vasum cassiforme* (Kiener, 1841), *Pleuroploca aurantiaca* (Lamarck, 1816), *Latirus* (*Polygona*) *ogum* n. sp., *Cerithium atratum* (Born, 1778), *Pisania pusio* (Linnaeus, 1758), *Thais rustica* (Lamarck, 1822), and *Astraea latispina* (Philippi, 1844). Fresh dead specimens of *Cypraea zebra dissimilis* Schilder, 1924, and *Conus brasiliensis* Clench, 1942, were frequently found on these reefs.

3. *Shallow Water Sand-Bottom Areas.*—Scattered among the larger reefs were pockets of coarse sand and coral rubble. These often accumulated in "bays" at the edges of the large eroded reef complexes. Species frequently encountered here were *Turbinella laevigata* Anton, 1839, *Cassis tuberosa* (Linnaeus, 1758), *Oliva circinata* Marrat in Sowerby, 1871, *Oliva* (*Plicoliva*) *zelindae* n. subgen. and n. sp., *Vexillum* (*Costellaria*) *kaicherae* n. sp., *Closia largillieri* (Kiener, 1841), *Olivella verreauxi* (Duclos, 1857), and *Conus jaspideus* Gmelin, 1791.

4. *Carbonate Mud Bottom.*—At depths of 20–25 m, the calcareous ooze substrate was covered with a thin layer of green algae. Crawling through this algal mat were *Conus iansa* n. sp., *Nassarius capillaris* (Watson, 1882), *Mitrella albovittata* Lopes, Coelho, and Cardoso, 1965, *Turritella exoleta* (Linnaeus, 1758), *Bullata bullata* (Born, 1778), and *Typhis* cf. *sowerbyi* (Broderip, 1833).

In general, gastropod species diversity was much lower than could be expected from an area of such diverse habitats. Though the species endemic to the islands are interesting, the absence of characteristic tropical western Atlantic rocky intertidal genera such as *Nerita*, *Tectarius*, *Echininus*, and *Nodilittorina* is especially noteworthy.

Systematic Part

Abbreviations used in this paper: USNM—United States National Museum Collection (now National Museum of Natural History); UMML—Invertebrate Museum Collection of the Rosenstiel School of Marine and Atmospheric Science, University of Miami; DMNH—Delaware Museum of Natural History.

Family Patellidae

Genus *Acmaea* Rathke in Eschscholtz, 1833Subgenus *Collisella* Dall, 1871*Acmaea* (*Collisella*) *abrolhosensis*, new species

Fig. 1, A and B

Material Examined.—HOLOTYPE—Length 22 mm, width 19 mm, Santa Barbara Is., Abrolhos Archipelago (17°58'S, 38°42'W), 27 July 1977, USNM 780644. PARATYPES—Lengths 21 mm, 18 mm, 17 mm, 17 mm, USNM 780645; lengths 21 mm, 21 mm, 20 mm, 19 mm, DMNH 121797; lengths 18 mm, 15 mm, 14 mm, Museu Nacional do Brasil, Rio de Janeiro, 3733; lengths 26 mm, 22 mm, 15 mm, 14 mm, 15 mm, 14 mm, 13 mm, UMML 8163–8169; all specimens from same locality, depth, and date as holotype.

Shell Description.—Shell flattened, smooth, oval in outline, fairly thick for its size; apex pointed with sloping sides; external color black with wide white bands radiating from apex; interior cream-colored with dark external radial color pattern showing through; callus dark brown with bluish-white center; edge of shell scalloped with undulating margin conforming to radial color pattern.

Coloration of Animal.—Pale greenish in life, fading to creamy white when preserved in ethyl alcohol.

Type-locality.—On rock, low water line, south side of Santa Barbara Is., Abrolhos Archipelago, Bahia State, Brazil (19°57'S, 38°42'W).

Distribution.—The new species is endemic to the rocky coasts of the islands of Santa Barbara, Redonda, Siriba, Sueste, and Guarita, of the Abrolhos Archipelago.

Ecology.—*Acmaea abrolhosensis* is a common species on all of the Abrolhos Islands. It is found primarily on algae-covered rocks at and slightly below the mean low tide line. The new species is most often associated with the gastropods *Siphonaria hispida* E. A. Smith, 1890, and *Littorina angulifera* (Lamarck, 1822).

Etymology.—Named for the Abrolhos Islands.

Remarks.—The shell of *A. abrolhosensis* is highly variable in color; some specimens are almost pure white while others are almost completely black. These darker morphs resemble the Fernando de Noronha Is. endemic, *A. noronhensis* E. A. Smith, 1890 (E. A. Smith, 1890:475–520, Righi, 1966:270, figs. 1–2, Rios, 1975:pl. 4, fig. 40). That species, however, lacks the white radiate markings that are characteristic of *A. abrolhosensis*. The closest relative of the new species is *A. subrugosa* d'Orbigny, 1846; this species ranges from Alagoas, Brazil, south to Uruguay. *A. subrugosa* differs from *A. abrolhosensis* by having a consistently finer external white radiating pattern, by having a larger central muscle scar, and by lacking the bluish-white clouding at the center of the callus.

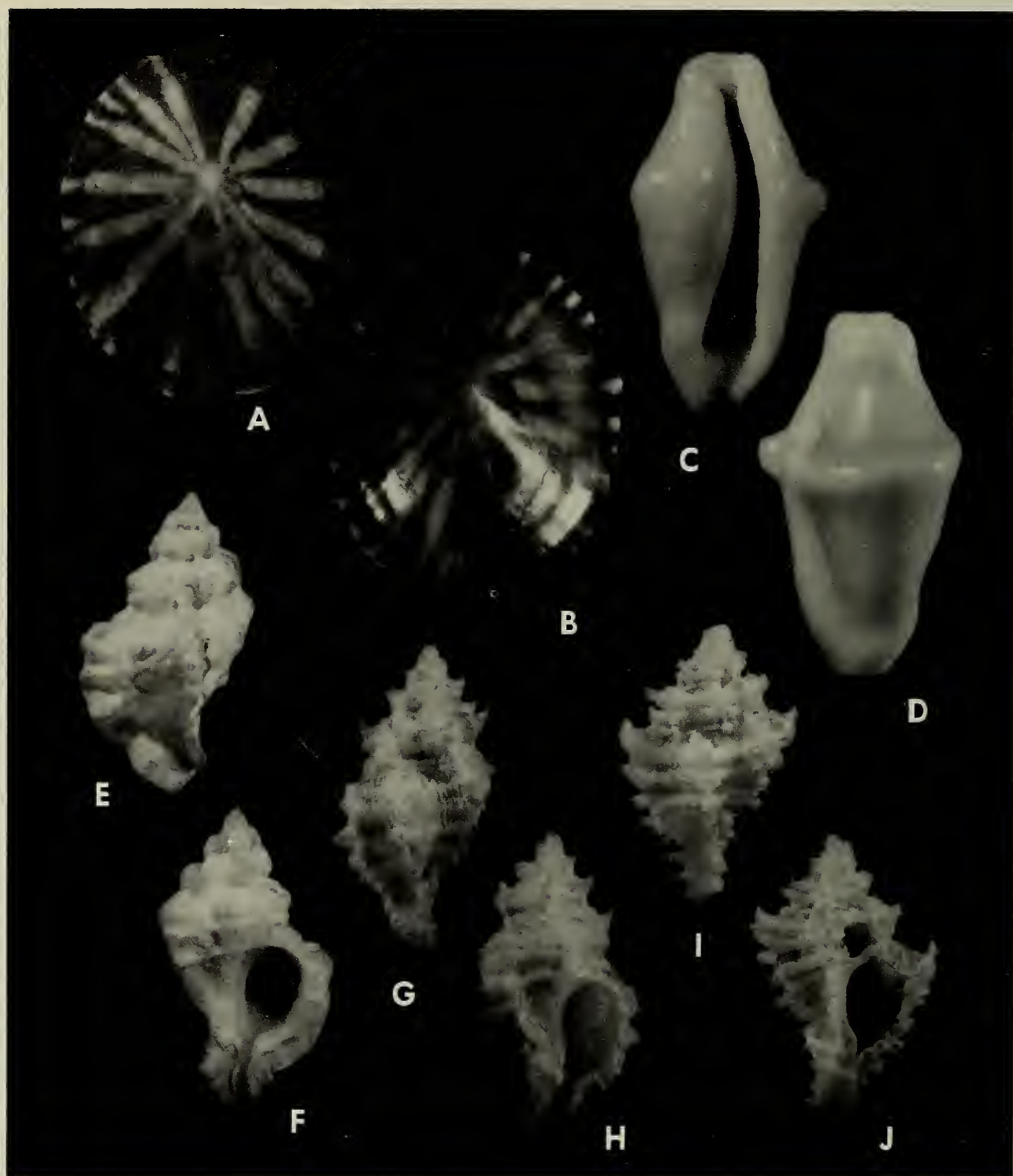


Fig. 1. A, *Acmaea (Collisella) abrolhosensis*, dorsal aspect of holotype; B, *Acmaea (Collisella) abrolhosensis*, ventral aspect of holotype; C, *Cyphoma macumba*, ventral aspect of holotype; D, *Cyphoma macumba*, dorsal aspect of holotype; E, *Dermomurex (Trialatella) oxum*, dorsal aspect of holotype; F, *Dermomurex (Trialatella) oxum*, ventral aspect of holotype; G, *Muricopsis oxossi*, dorsal aspect of holotype; H, *Muricopsis oxossi*, ventral aspect of holotype; I, *Murexiella iemanja*, dorsal aspect of holotype; J, *Murexiella iemanja*, ventral aspect of holotype.

Acmaea abrolhosensis is the newest member of an interesting species complex. This includes the mainland *A. subrugosa* and 3 offshore species, each endemic to a different island group; *A. abrolhosensis* to the Abrolhos Archipelago, *A. noronhensis* to Fernando de Noronha Is., and *A. marcusii* Righi, 1966, to Trindade Is. (Righi, 1966:269–270, figs. 1–6). The offshore island forms, though morphologically distinct, are similar to *A. subrugosa* and probably represent recent offshoots from that species.

The radulae of the 4 species differ greatly from each other. Righi (1966:277, figs. 12–14) illustrates and discusses the differences in radulae between *A. subrugosa*, *A. noronhensis*, and *A. marcusii*. When the radula of *A. abrolhosensis* (Fig. 2A) is compared with those of the 3 other species, it can be seen to be intermediate between *A. subrugosa* and *A. noronhensis*. However, the extremely well-developed cusp on the second lateral tooth is characteristic of the new species and sets it aside as distinct.

Family Ovulidae

Genus *Cyphoma* Röding, 1798

Cyphoma macumba, new species

Fig. 1, C and D

Material Examined.—HOLOTYPE—length 22 mm, width 13 mm, 2 m depth off Parcel das Paredes Reef, Abrolhos Reef Complex (17°47'S, 39°1'W), 24 July 1977, USNM 780646. PARATYPE: length 30 mm, Lixa Reef, Parcel das Paredes Reef area, Abrolhos Reef Complex (17°43'S, 38°59'W) 23 July 1977, USNM 780647.

Shell Description.—Elongate, shiny, with fine longitudinal striations; dorsal ridge prominent, sharp; outer lip thickened with protruding hornlike projection corresponding to dorsal ridge; color pale cream-orange to white; interior of aperture pale orange.

Animal.—Mantle transparent, with 4 groups of roughly rectangular-shaped markings arranged in longitudinal rows (Fig. 2B); rectangular markings bright golden-orange with fine black stripes and dashes and small white irregular spottings surrounded by black circles (Fig. 2C); each rectangular marking encircled by heavy black border; dorsum of foot cream-white with hundreds of fine black parallel lines radiating from body midline; entire foot edged with bright yellow border; siphon pure white edged with black; tentacles ochre-yellow with fine black stripe along entire dorsal side; eyes black; posterior mantle flap ruffled, pure white, bordered with black; penis elongate, smooth, transparent white with prominent, easily seen vas deferens.

Type-locality.—Two m depth off Parcel das Paredes, Abrolhos Reef Complex, Bahia State, Brazil (17°47'S, 39°1'W).

Distribution.—At present, known only from the Abrolhos Reefs.

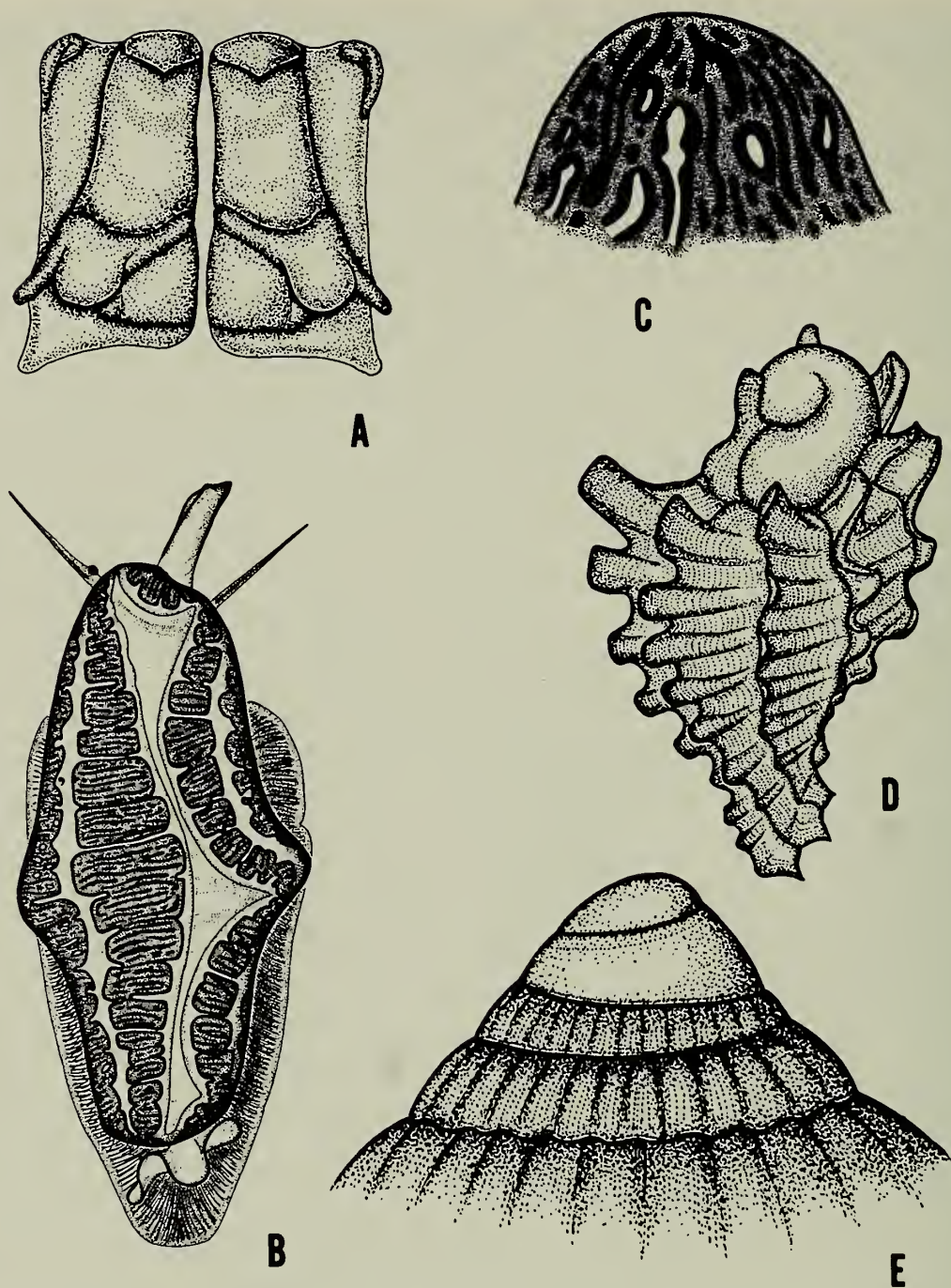


Fig. 2. A, Radular row of *Acmaea (Collisella) abrolhosensis*; B, Living animal of *Cyphoma macumba* (drawn from life); C, Detail of mantle color pattern of *Cyphoma macumba*. Stippled area is bright golden orange in life; D, Detail of a juvenile specimen of *Murexiella iemanja*; length 2 mm; E, Spire of *Oliva (Plicoliva) zelindae*, showing the well-developed plications.

Ecology.—The one living specimen was found crawling on the oak leaf-shaped gorgonian *Phyllogorgia dilatata* at a depth of 2 m.

Etymology.—For the African-based fetishistic Macumba religion that, like the new species in this paper, is indigenous to the coast of Brazil.

Remarks.—Interestingly enough, *Cyphoma macumba* was probably first reported living on *Phyllogorgia* by Hartt (1870:196). However, he confused it with *Cyphoma gibbosum* (Linnaeus, 1758), a species not found in the Abrolhos area. The new species is the only known Atlantic *Cyphoma* with

a prominent hornlike projection on the outer lip. In this respect *C. macumba* closely resembles the Panamic species *C. emarginatum* (Sowerby, 1830) (Cate, 1973:69, figs. 154–154a).

Family Muricidae

Genus *Dermomurex* Monterosato, 1890

Subgenus *Trialatella* Berry, 1964

Dermomurex (Trialatella) oxum, new species

Fig. 1, E and F

Material Examined.—HOLOTYPE—length 13 mm, width 7 mm, 25 m depth, 2 km east of Santa Barbara Is., Abrolhos Archipelago, Bahia State, Brazil (17°57'S, 38°41'W), 27 July 1977. USNM 780648. PARATYPES — length 8 mm, USNM 780649; fragment length 5 mm, UMML 8170; both from same locality, depth, and date as holotype.

Shell Description.—Stocky, broadly fusiform, with 5 whorls; aperture large, roughly $\frac{1}{3}$ length of shell; inside of outer lip with 6 elongate teeth that extend well into aperture; siphonal canal short, open, and dorsally recurved; early body whorls with 6 rounded varices; last body whorl with 3 expanded, crenulate, blade-like varices; body whorl sculpture consisting of 3 strong cords with raised pustules and 4 weaker spiral cords; intervarical region with 3 large, rounded knobs, each corresponding to one spiral cord; intricate white, composed of parallel rows of raised half-cylinders; interior of aperture yellow; operculum unknown.

Type-locality.—Twenty-five meters depth, 2 kilometers east of Santa Barbara Is., Abrolhos Archipelago, Bahia State, Brazil (19°57'S, 38°41'W).

Distribution.—Known only from the Abrolhos Archipelago.

Ecology.—The shells were found dead on top of the calcareous mud at the base of the “chapeirão” reef and most probably had rolled down the steep reef face after death. The species apparently lives cryptically in cracks and crevices in the reef.

Etymology.—Named for Oxum, principal sea god of the Macumba religion.

Remarks.—The only Atlantic *Dermomurex* that resembles *D. oxum* is *D. abyssicola* (Crosse, 1865) from deep water off Guadeloupe, Lesser Antilles. Actually, the new species most closely resembles *D. cunninghamae* (Berry, 1864) from 40 m depth off Guaymas, Sonora, Mexico. *D. oxum* can be considered the Atlantic cognate of *D. cunninghamae*.

Genus *Muricopsis* Bucquoy and Dautzenberg, 1882

Muricopsis oxossi, new species

Fig. 1, G and H

Material Examined.—HOLOTYPE—length 9 mm, width 5 mm, 25 m depth, 2 km east of Santa Barbara Is., Abrolhos Archipelago, Bahia State,

Brazil (17°57'S, 38°41'W), 27 July 1977. USNM 780650. PARATYPE—length 7 mm, USNM 780651, from same locality, depth, and date as holotype.

Shell Description.—Small, fusiform, spire high, acute; suture indistinct; sculpture consisting of 5 raised axial cords and numerous close-packed, overlapping scales, giving shell lamellose appearance; varices flattened, winglike, heavily scaled, with 5 flattened spines along edges; spine on shoulder largest, recurved posteriorly; spines on last varices fused into single large varical wing with serrate edge; 7 varies on last whorl of holotype; color creamy-yellow with 3 slightly darker bands, one at shoulder, one at mid-body, and one at base of siphonal canal; shell covered with irregular white intritricax; siphonal canal long, fully $\frac{1}{4}$ of shell length; aperture white; inner edge of outer lip with 5 low, rounded teeth; operculum unknown.

Type-locality.—Twenty-five meters depth, 2 kilometers east of Santa Barbara Is., Abrolhos Archipelago, Bahia State, Brazil (17°57'S, 38°41'W).

Distribution.—Known only from the Abrolhos Archipelago.

Ecology.—Like that of the previous muricid, *Dermomurex oxum*.

Etymology.—Named for Oxossi, a sea god of the Macumba religion.

Remarks.—*Muricopsis oxossi* resembles no other known Western Atlantic *Muricopsis*. The new species shows some relationship to *M. tulensis* Radwin and D'Attilio, 1976 (Radwin and D'Attilio, 1976:233–234), known only from the southern tip of Baja California.

Genus *Murexiella* Clench and Farfante, 1945

Murexiella iemanja, new species

Fig. 1, I and J

Material Examined.—HOLOTYPE—length 8 mm, width 6 mm, 25 m depth, 2 km east of Santa Barbara Is., Abrolhos Archipelago, Brazil (17°57'S, 38°41'W), 27 July 1977. USNM 780652. PARATYPE: length 10 mm, USNM 780653, from same locality, depth, and date as holotype.

Shell Description.—Stoutly fusiform; spire high, consisting of 2 nuclear and 3 post-nuclear whorls; suture indistinct; body whorl slightly globose; 7 varices per whorl, 5 large foliaceous spines on each varix; spine on shoulder well-developed, twice as long as other varical spines, posteriorly recurved; tips of all spines, except large shoulder spine, distinctly bifurcate; body whorl with 5 raised foliaceous cords corresponding to varical spines; siphonal canal long, straight, dorsally recurved at tip, with 3 foliaceous cords and short varical spines; aperture ovate; columellar lip adherent posteriorly, detached anteriorly; subsutural region of spire smooth, well-developed, giving shell wide-shouldered, angular appearance; color pinkish-white with distinctive large brown patches between each varix in subsutural region; operculum unknown.

Type-locality.—Twenty-five meters depth, 2 kilometers east of Santa Barbara Is., Abrolhos Archipelago, Bahia State, Brazil (17°57'S, 38°41'W).

Distribution.—Known only from the Abrolhos Archipelago.

Ecology.—As in *Dermomurex oxum* and *Muricopsis oxossi*—the 2 specimens being collected dead in calcareous mud at the base of a “chapeirão” reef.

Etymology.—Named for Iemanja, principal sea goddess of the Macumba religion.

Remarks.—*Murexiella iemanja* somewhat resembles *M. macgintyi* (M. Smith, 1938) from Florida and the Bahamas and *M. facetus* E. Vokes, 1970, from Aruba, but differs from both by having bifurcate spines, a higher spire, and by its smaller size. Fig. 2D shows a juvenile specimen of *M. iemanja*, 2 mm in length, composed of the protoconch and one whorl.

Family Fasciolaridae

Genus *Latirus* Montfort, 1810

Subgenus *Polygona* Schumacher, 1817

Latirus (*Polygona*) *ogum*, new species

Fig. 3, A and B

Material Examined.—HOLOTYPE—length 40 mm, width 18 mm, fringing reef around Coroa Vermelha, Abrolhos Reef Complex, Bahia State, Brazil (17°57'S, 39°13'W), 29 July 1977. USNM 780654.

Shell Description.—Holotype with 7 whorls, each with 8 elongate, low, rounded axial ribs; spiral sculpture on body whorl consisting of 15 raised cords, all equally prominent; siphonal canal long for genus, roughly $\frac{1}{3}$ length of shell; siphonal canal with 3 large, prominent cords, several secondary cords between; columella with 4 folds; inside of lip with 12 rows of large pustules, fusing into lirae deep inside aperture; color orange-red, darker on axial ribs; periostracum thin, reddish-brown, operculum unknown.

Type-locality.—In tide pool, west side of fringing reef around Coroa Vermelha, Abrolhos Reef Complex, Bahia State, Brazil (17°57'S, 39°13'W).

Distribution.—Known only from the Abrolhos Archipelago, but possibly lives elsewhere along the south Bahia and Espiritu Santo coasts.

Ecology.—Although the unique holotype was collected dead with a hermit crab, living *Latirus ogum* probably occurred on the same reef. The fringing reef around Coroa Vermelha contained many large tide pools filled with shell gravel and algae, an ideal habitat for *Latirus*.

Etymology.—Named for Ogum, a Macumba god often associated with the sea.

Remarks.—The “*Latirus* sp.” of Rios (1975: pl. 29, fig. 439) from “Couves Is.” may be a juvenile of *L. ogum*. *Latirus bernadensis* Bullock, 1974 (Pl. 2, Fig. C) from the Lesser Antilles and northern Brazil (Bullock,



Fig. 3. A, *Latirus (Polygona) ogum*, dorsal aspect of holotype; B, *Latirus (Polygona) ogum*, ventral aspect of holotype; C, *Latirus bernadensis*, holotype; D, *Oliva (Plicoliva) zelindae*, dorsal aspect of holotype; E, *Oliva (Plicoliva) zelindae*, ventral aspect of holotype.

1974:76–77, fig. 13) is a similar species, but differs from *L. ogum* in lacking the 3 prominent cords on the siphonal canal, and by having stronger spiral cords, lighter color, and a much more angled shoulder. *Latirus ogum* very closely resembles the Panamic *L. sanguineus* (Wood, 1828) (Keen, 1971:615, fig. 1333)—especially so with its red-orange color—and can be considered the Atlantic analogue.

Family Olividae
Genus *Oliva* Bruguiere, 1789
Subgenus *Plicoliva*, new subgenus

Diagnosis.—Shell olivid in form, polished, short, rotund, with prominent mamillate protoconch; body whorl with pronounced evenly-spaced, longitudinal plications running entire length of shell from spire suture to siphonal canal; plications especially prominent on spire and shoulder (Fig. 2E); columellar plications large, 6–12 in number, restricted to lower half of columella.

Type-species.—*Oliva (Plicoliva) zelindae*, new species.

Oliva (Plicoliva) zelindae new species
Fig. 3, D and E; Fig. 4, A and B

Material Examined.—HOLOTYPE—length 31 mm, width 24 mm, Guaratibas Reefs, Abrolhos Reef Complex, Bahia State, Brazil (17°25'S, 39°8'W), 19 July 1977. USNM 780655. PARATYPES—length 32 mm, USNM 780656; length 27 mm, my collection; both from same locality and data as holotype; length 26 mm, Museu Nacional do Brasil 3734, Santa Barbara Is., Abrolhos Archipelago (17°58'S, 38°42'W).

Shell Description.—Form and sculpture as for subgenus; color pattern composed of network of fine “tent” markings with series of dark, evenly-spaced vertical bars around middle, in turn connected by thin, continuous dark band; spire marked with intermittent dark checkers; color pattern varying from orange-brown to black on white background.

Type-locality.—In shell gravel 1 m depth in tide pool, south side of Guaratibas Reefs, north end of Abrolhos Reef Complex, Bahia State, Brazil (17°25'S, 39°8'W).

Distribution.—Known only from the Abrolhos Archipelago and Reef Complex.

Ecology.—The new species appears to live in sand and shell gravel areas in shallow water on and around the larger reefs and islands. *Costellaria kaicherae* n. sp., *Closia largillieri* (Kiener, 1841), small *Lucina* spp. and *Corbula* spp. were the only mollusks commonly found with *O. zelindae* on the Guaratibas Reefs.

Etymology.—Named for Zelinda Margarida Leão, marine geologist of the Universities of Miami and Bahia, Salvador, Brazil, whose invaluable help made it possible for me to visit the Abrolhos Archipelago in 1977.

Remarks.—*Oliva (Plicoliva) zelindae* is probably the most aberrant of the known Olividae. Having both the longitudinal plications on the body whorl and the enlarged columellar plications, the new species resembles volutes in the genera *Lyria* or *Enaeta* more than typical *Oliva* or *Olivella*. At first glance, *O. zelindae* might be taken for a volutid, but the typical olive shape,

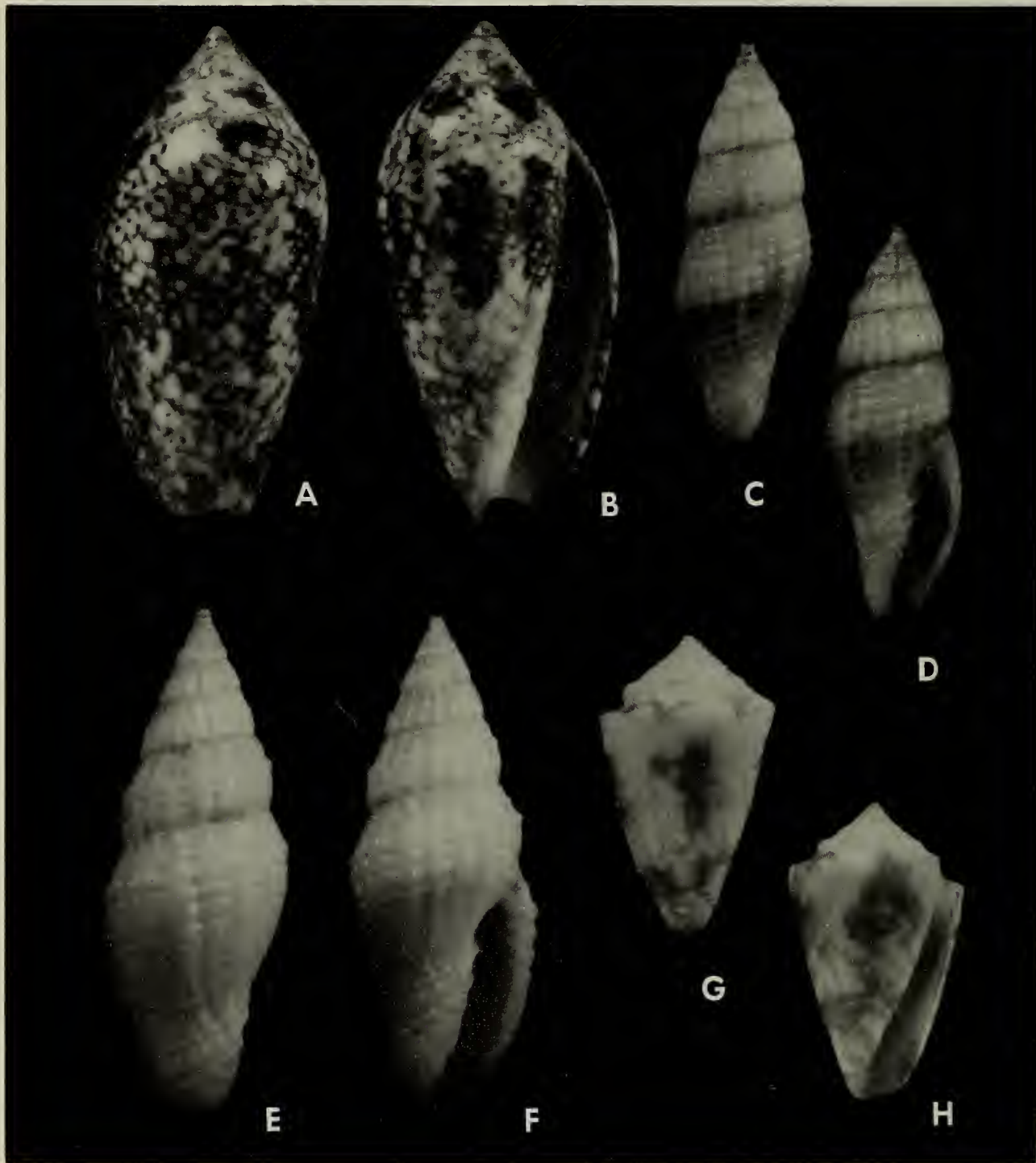


Fig. 4. A, *Oliva (Plicoliva) zelindae*, dorsal aspect of paratype; B, *Oliva (Plicoliva) zelindae*, ventral aspect of paratype; C, *Vexillum (Costellaria) kaicherae*, dorsal aspect of holotype; D, *Vexillum (Costellaria) kaicherae*, ventral aspect of holotype; E, *Vexillum (Costellaria) lixa*, dorsal aspect of holotype; F, *Vexillum (Costellaria) lixa*, ventral aspect of holotype; G, *Conus iansa*, dorsal aspect of holotype; H, *Conus iansa*, ventral aspect of holotype.

high gloss, and multiple columellar plications point to placement in the Olividae.

There are no known Caribbean fossil olives that show any relationship to *Plicoliva*. It appears that the subgenus has been endemic to the Abrolhos area since at least the Miocene.

Family Costellariidae

Genus *Vexillum* Röding, 1798Subgenus *Costellaria* Swainson, 1840*Vexillum* (*Costellaria*) *kaicherae*, new species

Fig. 4, C and D

Material Examined.—HOLOTYPE—length 8 mm, width 3 mm, 1 m depth, tide pool on Guaratibas Reefs, Abrolhos Reef Complex, Bahia State, Brazil (17°25'S, 39°8'W), 19 July 1977. USNM 780657. PARATYPES: lengths 9 mm, 6 mm, USNM 780658; length 9 mm; UMML 8171, fragment length 6 mm, UMML 8172; lengths 9 mm, 9 mm; DMNH 121796; lengths 9 mm, 7 mm, Museu Nacional do Brasil 3735; length 8 mm, collection of Sally D. Kaicher; all from same locality, depth, and date as holotype.

Shell Description.—Small, fusiform, elongate, biconic; shoulder rounded; suture well-developed, indented; most adult shells with 5 whorls; protoconch mamillate, composed of one and one-half whorls; sculpture composed of 15–18 axial ribs, each studded with regularly-spaced round nodules; columella with 4 folds; anterior half of shell dark reddish-brown; spire cream-white checkered with occasional brown spots; interior of aperture brown.

Type-locality.—One meter depth in tide pool, south end of Guaratibas Reefs, Abrolhos Reef Complex, Bahia State, Brazil (17°25'S, 39°8'W).

Distribution.—Known only from the Abrolhos Reef Complex.

Ecology.—All specimens were collected dead between sand ripples in tide pools. Other dead shells that accumulated with the new species were *Oliva zelindae* n. sp., *Oliva circinata* Marrat in Sowerby, 1871, *Conus iansa* n. sp., *Closia largillieri* (Kiener, 1841), and small *Lucina* and *Corbula* spp. It is presumed, judging from the fresh condition of the type-specimens, that *V. (Costellaria) kaicherae* lived in the same tide pools—probably buried in the sand during the day.

Etymology.—For Sally Diana Kaicher, malacologist and professional photographer, of St. Petersburg, Florida, in recognition of her work in the family Costellariidae and for her excellent scientific photography, which have both been of great assistance to many scientists.

Remarks.—Although the shape and sculpturing of *V. (Costellaria) kaicherae* resembles that of typical costellariids, the one and one-half-whorl protoconch points to a relationship with the pusiids. Is it possible that *V. kaicherae* and the following new species represent a new subgenus intermediate between the subgenera *Costellaria* and *Pusia*.

Vexillum (Costellaria) lixa, new species

Fig. 4, E and F

Material Examined.—HOLOTYPE—length 12 mm, width 5 mm, 1 m depth in tide pool, west side of Lixa Reef, Abrolhos Reef Complex, Bahia

State, Brazil (17°43'S, 38°59'W), 23 July 1977. USNM 780659. PARATYPES—lengths 19 mm, 12 mm, USNM 780660, both from same locality, depth, and date as holotype.

Shell Description.—Fusiform, elongate, biconic; shoulder sharply angled; sculpture with 15–17 axial ribs per whorl and 17–20 spiral ridges giving shell nodulose appearance; adult shell with 6 whorls; protoconch mamillate, composed of one and one-half whorls; columella with 4 folds; spire and shoulder pure white, anterior half of shell rose-pink; interior of aperture pink.

Type-locality.—One meter depth in tide pool, west side of Lixa Reef, Abrolhos Reef Complex, Bahia State, Brazil (17°43'S, 38°59'W).

Distribution.—Known only from Abrolhos Reef Complex.

Ecology.—Like *V. (Costellaria) kaicherae*, *V. lixa* was collected dead between sand ripples in large tide pools.

Etymology.—For Lixa Reef (Pedra Lixa), the type-locality—which is named after the lixa, a Bahiano term for any kind of small reef shark.

Remarks.—*V. (Costellaria) lixa* bears an amazing resemblance *V. modestum* (Reeve, 1845) from the Indo-Pacific. The 2 species are very close in shell color, shape, size, and sculpture. However, this similarity must be considered as convergence on similar shell morphologies and does not reflect phylogenetic or zoogeographic relationships. Although almost identical morphologically, the 2 species have evolved from different stocks: *V. modestum* has a typical costellariid protoconch and arose from the classic Indo-Pacific *Costellaria* line while *V. lixa* has a pusiid-type protoconch and, along with *V. kaicherae*, probably represents a mid-Tertiary off-shoot of *Pusia* lineage in the South Atlantic.

Family Conidae

Genus *Conus* Linnaeus, 1758

Conus iansa, new species

Fig. 4, G and H

Material Examined.—HOLOTYPE—length 12 mm, width 7 mm, in calcareous mud, 25 m depth, 2 km east of Santa Barbara Is., Abrolhos Archipelago (17°57'S, 38°41'W), Bahia State, Brazil, 27 July 1977, USNM 780661. PARATYPES—length 13 mm, in shell gravel, 1 m depth in tide pool, Lixa Reef, Abrolhos Reef Complex (17°57'S, 39°41'W), 23 July 1977, USNM 780662; length 15 mm, in sand, 1 m depth off Guaratibas Reefs, Abrolhos Reef Complex (17°25'S, 39°8'W), 19 July 1977, UMML 8173; length 14 mm, same locality, depth, and date as holotype, my collection.

Shell Description.—Small, shiny, squat, with wide, heavily coronated shoulder; anterior half of last whorl with 8–15 deeply impressed spiral sulci, posterior half smooth; spire elevated with mamillate protoconch; color variable, ranging from white to shades of pink and orange; color pattern composed of series of dots and dashes in close-packed spiral rows overlaid with

large amorphous patches of darker color; some specimens greyish-white with bright white color pattern; spire with alternating patches of darker color; interior of aperture white; periostracum thin, smooth, transparent yellow, with small shaggy tufts on shoulder.

Animal.—Foot and body translucent grey with numerous small white patches; proboscis tipped with black; eyes black; operculum tiny, oval.

Type-locality.—Twenty-five meters depth, 2 kilometers east of Santa Barbara Is., Abrolhos Archipelago, Bahia State, Brazil (17°57'S, 38°41'W).

Distribution.—The new cone appears to be restricted to the Abrolhos Archipelago and Reef Complex.

Ecology.—*Conus iansa* prefers a soft substrate, such as calcareous mud or sandy gravel, on or near the reef complex. It most probably feeds on small polychaete worms. Associated mollusks include: *Turritella exoleta* (Linnaeus, 1758), *Turbinella laevigata* Anton, 1839, *Oliva (Plicoliva) zelandae* n. sp., *Oliva circinata* Murrat in Sowerby, 1871, *Nassarius capillaris* (Watson, 1882), and *Mitrella albobittata* Lopes, Coelho, and Cardoso, 1965.

Etymology.—Named for Iansã, a Macumba goddess often associated with both the moon and the sea.

Remarks.—*Conus iansa* resembles no other known Western Atlantic cone shell. In some aspects, such as shell coloring and the coronated spire, the new species resembles some forms of *C. otohimeae* Kuroda and Ito, 1961, from Japan and Taiwan. *Conus iansa* may be allied to the *Conus magellanicus* Hwass, 1972—*Conus speciosissimus* Reeve, 1848, species complex of the West Indies; this assumption is based on the small shell size and strongly coronated shoulder. Members of this complex are always associated with hard-bottom communities on Caribbean reefs, and the soft-bottom habitat of *C. iansa* is unusual.

Besides *C. iansa*, only 2 other species of cone shells are known from the Abrolhos region; *C. brasiliensis* Clench, 1942 (Van Mol, Tursch, and Kempf, 1967:237–238, map 2) and *C. jaspideus* Gmelin, 1791.

Acknowledgments

I would like to thank Mr. Arnaldo C. dos Santos Coelho, Museu Nacional do Brasil, Rio de Janeiro, for loan of study material from the Abrolhos Archipelago, and Mrs. Zelinda Margarida Leão, Universities of Bahia, Brazil, and Miami, for allowing me the opportunity of joining her on her doctoral research trip to the Abrolhos. Special thanks are given to Sally Diana Kaicher, St. Petersburg, Florida, for the excellent photographs used in this paper, to Dr. Gilbert L. Voss, Rosenstiel School of Marine and Atmospheric Science, University of Miami, for critical review and encouragement in my research, and to Dr. Donald R. Moore, also of the Rosenstiel School, for help in sorting of material.

Literature Cited

- Bullock, Robert C. 1974. A contribution to the systematics of some West Indian *Latirus* (Gastropoda: Fasciolaridae).—*The Nautilus* 88(3):76–77, fig. 13.
- Cate, Crawford Neill. 1973. A systematic revision of the recent Cypraeid Family Ovulidae (Mollusca: Gastropoda).—*The Veliger* 15 (Supplement): 69, figs. 154–154a.
- Hartt, Charles Frederick. 1870. Geology and physical geography of Brazil. Chapter IV. The islands and coral reefs of the Abrolhos.—Thayer Expedition Report. Fields, Osgood and Co., Boston, pp. 174–214.
- Keen, A. Myra. 1971. Sea shells of tropical West America.—Second Edition. Stanford University Press, Stanford, California. p. 615, fig. 1333.
- Laborel, Jacques. 1969. Les Peuplements De Madreporaires Des Côtes De L'État De Bahia Et Les Abrolhos.—*Annales De L'Université D'Abidjan, Série E, II, Fascicule 3, Écologie*:125, 131, 135–142, figs. 45, 58, 50–55.
- Radwin, George E. and Anthony D'Attilio. 1976. Murex shells of the World. An illustrated guide to the Muricidae.—Stanford University Press, Stanford, California. pp. 233–234.
- Righi, G. 1966. On the Brazilian species in the *Acmaea subrugosa* complex.—*Malacologia* 4(2):269–295, plates 1–2, figs. 1–2, 12–14.
- Rios, E. C. 1975. Brazilian Marine Mollusks Iconography.—*Fundação Universidade do Rio Grande, Museu Oceanografico*. p. 104, figs. 437, 439.
- Smith, E. A. 1890. Notes on the zoology of Fernando de Noronha.—*Lin., Soc. Jour. Zool.* 10:479–503, pl. 30.
- Van Mol, J-J., B. Tursch and M. Kempf. 1967. Mollusques Prosobranches: Les Conidae du Bresil. Résultats Scientifiques des Campagnes de la "Calypso." *Annal. l'Inst. Océanogr.* XLV(16):237–238, map 2.

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